CLAIMS

What is claimed is:

1. A method for controlling automatic downshifting in a vehicular automated mechanical transmission system (10) for a vehicle comprising a fuel-controlled engine (12), a multiple-speed mechanical transmission (14), and a controller (28) for receiving input signals (30) including one or more of signals indicative of engine speed (ES), engaged gear ratio (GR) and vehicle speed (OS), and for processing said input signals in accordance with logic rules to issue command output signals (32) to transmission system actuators including a transmission actuator (52) effective to shift said transmission, said method including the steps of:

(a) determining an Engine Acceleration (EA) rate during a downshift from a currently engaged ratio (GR) to a desired downshift target gear ratio (GR_{TARGET});

(b) determining if said Engine Acceleration (EA) rate is less than a Free Engine Acceleration (FEA) rate,

whereby a false Neutral condition is detected when said Engine Acceleration (EA) rate is less than said Free Engine Acceleration (FEA) rate.

2. The method according to Claim 1, further comprising the step of retaining said transmission in said currently engaged ratio (GR) when the false Neutral condition is detected.

3. The method according to Claim 1, further comprising the step of continuing with the downshift to said target gear ratio (GR_{TARGET}) when the false Neutral condition is not detected.

4. A method for controlling automatic downshifting in a vehicular automated mechanical transmission system (10) for a vehicle comprising a fuel-controlled engine (12), a multiple-speed mechanical transmission (14), and a controller (28) for receiving input signals (30) including one or more of signals indicative of engine speed (ES), engaged gear ratio (GR) and vehicle speed (OS), and for processing said input signals in accordance with logic rules to issue command

output signals (32) to transmission system actuators including a transmission actuator (52) effective to shift said transmission, said method including the steps of:

(a) determining an Engine Acceleration (EA) rate during a downshift from a currently engaged ratio (GR) to a desired downshift target gear ratio (GR_{TARGET});

(b) determining if said Engine Acceleration (EA) rate is less than a Free Engine Acceleration (FEA) rate, and if not, then continuing with the downshift to said target gear ratio (GR_{TARGET}), and if so, then retaining said transmission in said currently engaged ratio (GR).

5. A method for controlling automatic downshifting in a vehicular automated mechanical transmission system (10) for a vehicle comprising a fuel-controlled engine (12), a multiple-speed mechanical transmission (14), and a controller (28) for receiving input signals (30) including one or more of signals indicative of engine speed (ES), engaged gear ratio (GR) and vehicle speed (OS), and for processing said input signals in accordance with logic rules to issue command output signals (32) to transmission system actuators including a transmission actuator (52) effective to shift said transmission, said method including the steps of:

(a) determining an Engine Acceleration (EA) rate during a downshift from a currently engaged ratio (GR) to a desired downshift target gear ratio (GR_{TARGET});

(b) determining if a difference between a Free Engine Acceleration (FEA) rate and said Engine Acceleration (EA) rate is greater than a predetermined value, and if not, then continuing with the downshift to said target gear ratio (GR_{TARGET}), and if so, then retaining said transmission in said currently engaged ratio (GR).

6. A control system for controlling automatic downshifting in a vehicular automated mechanical transmission system (10) for a vehicle comprising a fuel-controlled engine (12), a multiple-speed mechanical transmission (14), and a controller (28) for receiving input signals (30) including one or more of signals indicative of engine speed (ES), engaged gear ratio (GR) and vehicle speed (OS), and for processing said input signals in accordance with logic rules to issue command

output signals (32) to transmission system actuators including a transmission actuator (52) effective to shift said transmission, said control system including logic rules for:

(a) determining an Engine Acceleration (EA) rate during a downshift from a currently engaged ratio (GR) to a desired downshift target gear ratio (GR_{TARGET});

(b) determining if said Engine Acceleration (EA) rate is less than said Free Engine Acceleration (FEA) rate,

whereby a false Neutral condition is detected when said Engine Acceleration (EA) rate is less than a Free Engine Acceleration (FEA) rate.

7. The control system of Claim 6, wherein said transmission is retained in said currently engaged ratio (GR) when the false Neutral condition is detected

8. The control system of Claim 6, wherein the downshift to said target gear ratio (GR_{TARGET}) is continued when the false Neutral condition is not detected.

9. A method for controlling automatic downshifting in a vehicular automated mechanical transmission system (10) for a vehicle comprising a fuel-controlled engine (12), a multiple-speed mechanical transmission (14), and a controller (28) for receiving input signals (30) including one or more of signals indicative of engine speed (ES), engaged gear ratio (GR) and vehicle speed (OS), and for processing said input signals in accordance with logic rules to issue command output signals (32) to transmission system actuators including a transmission actuator (52) effective to shift said transmission, said method including the steps of:

(a) determining an input shaft rotational speed (IS) and an output shaft rotational speed (OS) during a downshift from a currently engaged gear ratio (GR) to a desired downshift target gear ratio (GR_{TARGET});

(b) determining if (ABS((OS*GR)-IS)) is less than a predetermined value,

whereby a false Neutral condition is detected when said (ABS((OS*GR)-IS)) is less than said predetermined value.

10. The method according to Claim 9, further comprising the step of retaining said transmission in said currently engaged ratio (GR) when the false Neutral condition is detected.

11. The method according to Claim 9, further comprising the step of continuing with the downshift to said target gear ratio (GR_{TARGET}) when the false Neutral condition is not detected.